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FOREST INSECT SURVEY. LASSEN NATIONAL FOREST.

Season 1939

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FOREST INSECT SURVEY. LASSEN N. F.

Season 1939

INTRODUCTION

During 1937 the Eastern Lassen Area was covered by an intensive cruise as part of the season's work of the Hazard Inventory Project (2). An extension of this project during 1938 covered the portion of the Lassen Forest referred to as the Hat Creek Basin in the Burney Area. One objective of this survey was to determine the potential hazard to the green stand from insect loss. This survey made possible a uniform segregation of the various timbered areas into infestation units. These infestation units, illustrated on the accompanying map, figure 1, segregate the various stand conditions into homogeneous areas where current insect activity can be more easily recognized, judged, and reported upon.

Eleven permanent sample plots, 320 acres in size, are located within the several units of the Eastern Lassen to sample virgin stands. During 1939, in conjunction with studies of "Climatic Influence on Insect Loss" R. C. Hall and C. B. Eaton established 35 permanent sample plots, 20 acres in size, in the Burney Area. Twenty six of these plots sample conditions in the Hat Creek Basin. A yearly cruise of all sample plots is made by members of the Berkeley Laboratory, U. S. Bureau of Entomology and Plant Quarantine, to determine current infestation conditions.

In 1939, the sample plots in the Eastern Lassen were cruised during a three week period in September and October by a three man survey party headed by G. F. Weaver. Additional data on infestation conditions not adequately sampled by plots was secured through reconnaissance made during November by J. W. Bongberg. As a result of the current increase of insect activity in the west side Lassen, it was necessary to extend the 1939 forest insect survey to this area. Two separate reconnaissance trips were made to cover this area: one by K. A. Salman in Septmmber and another by J. E. Patterson and G. R. Struble in October.

This report will cover the current insect conditions on the infestation units and hazard zones of the Eastern Lassen Area and Hat Creek Basin and, in addition, briefly cover the west side infestations as reported upon by Salman (5), Patterson and Struble (4). By using available data from all areas an attempt will be made to predict or judge the trend of the 1940 infestation.

IMPRESSIONS OF THE 1939 INFESTATION

1. Eastern Lassen Area

The ratio of increase of the current insect loss over the 1938 season has been 1.8. The average pine loss for the current year is estimated at 107 BM per acre. Group losses are frequent but widely scattered. A "flare-up" of top-killing engraver beetles, namely Ips oregoni Eichh., have been responsible for a majority of the initial attacks in the group losses. Winter broods of the western pine beetle readily attacked the remaining green boles of the previously top-killed trees. All broods of the winter generation of the western pine beetle are exceptionally heavy and successful. Activity by flathead borers appears to be greater in the fringe areas than in 1938. Mountain pine beetle activity in ponderosa pine has been light and attacks have been limited to the basal portion of the bole. Current activity by the Jeffrey pine beetle has shown a decided decrease, especially on fringe areas. All trees show very little resistance to beetle attacks as evidenced by a conspicuous absence of pitch tubes. A large portion of the green stand is in a very decadent condition. By using data collected by the Hazard Inventory Project during 1937 it is found that 20.2% of the total green volume was rated as being composed of high risk trees. During 1939, an abundance of top-killing, flagging of twigs and branches, and an excessive needle cast has added to this decadent material. The prolonged warm fall season added materially to the seasonal pine beetle activity. The over-wintering generation of pine beetle broods consist primarily of larva and providing sub-normal winter temperatures do not reduce beetle populations, there should be a heavy emergence and a continued increase in the infestation in the Spring.

2. Hat Creek Basin. Burney Area.

As reported by R. C. Hall, "the general condition of the 1939 infestation in the Burney Area is characterized by a preponderance of trees killed by a western pine beetle with local grouping tendencies general throughout the area. Ips grouping in pole stands is of a decided local character and is principally confined to the Hatchet Mountain Unit at low elevations on the east slope of Hatchet Mountain. The largest group loss, killed by the 1939 generation of the western pine beetle, was 15 trees located near the Wilcox grade school at a low elevation on an east slope. In general this type of loss consists of two, three, and four trees. Losses in sugar pine are occurring primarily as singly killed individuals but rarely a small group is encountered. Current losses in incense cedar and Douglas fir are negligible. The loss trend is generally upward in all areas for 1939 and, on the average, is expected to be about one and three quarter times that of the 1938 figure.".

3. West Side Lassen Area

3 As previously mentioned, the extension of the 1939 forest insect survey to cover this area was made by reconnaissance as a result of a considerable increase in current insect activity. Reports covering the infestation and recommendations for control in these areas have been made by Salman, Patterson and Struble, and it will not be necessary to repeat a full discussion of the infestation. In brief, the following conditions were reported:

A. Deer Creek Drainage

"Activity of the western pine beetle in ponderosa pine shows a marked increase and spread over the 1938 infestation. The estimated 1939 loss is set at 200 trees per section in the ponderosa pine stands on the south slopes of the ridge separating the Deer Creek and Mill Creek drainages. The infestation occurs primarily in thrifty and vigorous trees. Sugar pine losses in all age classes have been heavy and the infestation is estimated at 150 individual trees per section in some areas." (Salman 5).

B. West Shore Lake Almanor

"The presence of scattered groups of from two to five infested sugar pines is evidence of an increased activity." (Salman 5). "The infestation in ponderosa pine is general throughout the area. There is a moderate amount of group loss in all tree types. General infestation characteristics indicate that the western pine beetle infestation will continue with approximately the same intensity as that shown the current year." (Patterson and Struble 4).

C. Inskip-Flea Valley

"A most spectacular infestation in sugar pine was found northeast of Stirling City. Losses were estimated to average about 60 trees per section. One group of about 10 trees was noted and smaller groups and individual trees were numerous. The heavy infestation was seen to extend to the east as far as Bald Hill and to all appearances the infestation was general throughout the area." (Salman 5).

INSECT LOSS ON INFESTATION UNITS

1. Eastern Lassen Area

A summary and comparison of the past three seasons loss on the eleven permanent plots sampling the virgin areas in the Eastern Lassen is given in Table 1. The 1939 plot data, supplemented by reconnaissance notes,

are used in estimating the total current loss for the infestation units, (Table 2). Because of the varied insect conditions on portions of the area it is necessary to supplement the data given in table form by a brief discussion. Units have been grouped according to their similarity in current infestation trends.

A. Bogard Buttes and Stephens Ranch

Current insect activity on these two units shows a definite increase over the past two seasons with much of the pine loss occurring in overmature decadent tree types. Numerous infested trees occurred in small two-to-three tree groups. This grouping tendency was more pronounced in the summer kill but was also evident in the winter loss thus indicating a continuation of heavy losses. Winter broods of the 1939 generation of western pine beetles were found to be exceptionally heavy. It is estimated that the current pine loss will range from 105-140 BM per acre.

B. Butte Creek, Halls Flat, Straylor Lake, Gordon Valley, Cave Mountain

Plot data and reconnaissance notes show that current insect activity on each of these five units has been of a similar nature. Estimates show the 1939 loss to range from 70-90 BM per acre. Group loss, composed primarily of small tree groups is general, with an occassional larger group in evidence on exposed ridges and slopes. This loss is definitely an increase over the past season. General tree decadence over the area as a whole indicated that the possibility of heavier loss in the near future is quite probable.

C. Black's Mountain, Crater Mountain, Harvey Valley

There has been a considerable increase in current insect activity in all these areas with estimates showing the increase to be from two to three times more than the 1938 loss. In general, the overmature decadent tree types make up the majority of the current loss in pine but there are several large group kills present. This group loss is made up largely of more vigourous tree types. One group numbering close to 50 trees can be seen on the south slope of Crater Mountain. Another large group is present on the east side of Cone Mountain. These large groups are widely scattered as are the numerous smaller groups throughout the area. The current drain on the green stand is estimated at 125-175 BM per acre.

D. Nigger Springs, Beaver Creek, Coble Mountain, Brockman Flat, and Dixie Valley.

For the most part these five units represent fringe conditions. Current losses in these areas have not shown the increase mentioned for the remaining Eastern Lassen. The trend of the infestation is definitely upward with estimates of the 1939

loss ranging from 80-100 BM per acre. In general, only the decadent overmature trees are showing in the loss picture. Grouping tendencies are not present to any large extent. Past losses on these areas have been exceptionally heavy but the lower estimates should not be used to indicate a quiescent condition. The remaining green stand is composed of a large amount of high risk material capable of supporting large pine beetle populations.

2. Hat Creek Basin. Burney Area.

All of the plots in the Hat Creek Basin sampling conditions in the Lassen Forest were established during the 1939 field season. ?At the time of the fall survey, in addition to taking records of the 1939 loss, insect activity for the past two seasons was secured by a measurement of trees killed during 1937 and 1938. A summary and comparison of the past three seasons loss on the 25 permanent plots sampling conditions in the infestation units is shown in Table 3. These plot records have been supplemented by reconnaissance notes on surrounding areas and used for estimating the total loss on the respective units. As reported by R. C. Hall, the following conditions prevail:

A. Hatchet Mountain, Tamarack, and Bunchgrass.

"Current insect activity over the majority of the area in these three units has been of a similar nature. There has been a general increase in insect caused loss during 1939 but nothing is in evidence to indicate epidemic conditions. Losses in ponderosa pine are relatively light and activity generally quiet. Some grouping was observed in mature timber and pole stands at the base of Hatchet Mountain on the east and locally in Jeffrey pine at lower elevations on Prospect Peak."

B. Cornez Lake, Hat Creek, and Big Springs

"In contrast to the above mentioned units, there has been a decided increase in activity on these areas. Grouping tendencies are general throughout. The majority of this type of loss occurred in large overmature trees but a single group of youngergrowth more thrifty tree types was observed near the Wilcox grade school. The heaviest pine losses occurred on the area east and northeast of Burney Mountain. Estimates place the current insect caused loss on these areas to range from 104-151 BM per acre. Losses in other tree species were slight."

INSECT LOSS BY HAZARD ZONES

1. Eastern Lassen Area

A completed map of the hazard zones of the timbered areas in the Eastern Lassen is shown in figure 1. Three degrees of hazard are repre-

sented, namely, moderate, (hazard III), high (hazard IV), and very high (hazard V). From table 4 it can be seen that the past three seasons loss is closely correleated with the degree of hazard. However, as previously indicated in the discussion of the current infestation by infestation units, the increase of the 1939 loss was greater in areas of lower hazard. As seen in table 4, the ratio of increase was 2.14, 1.98, and 1,32 in hazards III IV, and V respectively. By volume, the loss in hazard V was 24% lower than hazard IV and 21% lower than hazard III.

Table 4

Hazard Zones	Insect Loss Percent Residual			Ratio '39/'38
	1937	1938	1939	
III	.34	.35	.75	2.14
IV	.60	.45	.89	1.98
V	1.34	1.21	1.60	1.32

2. Hat Creek Basin, Burney Area.

In the Hat Creek Basin of the Burney Area, hazard zones II,III and IV are represented (figure 2). In general the loss records for 1938 and 1939 show a close correlation between hazard and loss for these two years (table 5). The yearly variation in loss between hazard zones is to be expected because of the relatively short period of time in which data has been collected. A comparison of tables 2 and 3 will show a similar trend of loss in comparable hazard zones.

Table 5

Hazard Zones	Insect Loss Percent Residual		Ratio '39/'38
	1938	1939	
II	.40	.45	1.13
III	.63	.94	1.49
IV	.73	.84	1.15

INSECT LOSS ON CUTOVER AREAS

Permanent plots sampling losses on cutover areas on the Lassen Forest are limited to the Eastern Lassen Area. A sample of loss conditions on other areas is made at periodic intervals only when conditions warrant such action. The following discussion is limited to the Eastern Lassen.

Cutover areas are indicated on the accompanying map, figure 1, and for the most part, cutting has been concentrated in four infestation units. These areas are sampled by seven permanent plots. Because of the varied cutting practices, no attempt will be made to use the plot data to estimate losses on the infestation units. A summary and comparison of the 1938 and 1939 plot loss is given in table 6. The estimated 1939 loss of 16 BM per acre is an increase of four times the loss occurring in 1938. However, with the best available estimate of annual increment, 76 BM per acre, the increased 1939 infestation still leaves a favorable depletion-increment balance.

The most alarming condition to be found on the cut-over area is the current group loss in the younger thrifty tree types. A single group kill numbering 23 trees was observed between Little Harvey Valley and Champs Flat on the Harvey Valley infestation unit. This condition is general and scattered, being especially conspicuous in the 1937 and 1938 cuttings.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions regarding infestation conditions on this relatively large area can briefly be summarized in one sentence; the insect infestation is increasing and from all indications, this upward trend is very likely to continue during the next season.

General recommendations of action to check this beetle activity are difficult to make. Because of the diversified conditions represented it is necessary to formulate recommendations applicable to specific areas.

1. West Side Lassen

Recommendations for control possibilities on these areas have been formulated by Salman (5), Patterson and Struble (4), and there is no need to duplicate these recommendations here. Reference should be made to the above mentioned reports.

2. Eastern Lassen Area

It is the opinion of Craighead, Miller, Keen, and others (1) that the results obtained and the expense incurred does not warrant making an attempt to combat the beetles on large unbounded areas by direct measures utilizing methods of felling and peeling infested trees and burning the infested bark. The majority of the Eastern Lassen Area falls into the category of large unbounded areas. However, it certainly is not the best practice to accept this heavy loss in the high value timber and make no attempt to utilize the values or reduce the menance.

A cooperative project between the Fruit Growers Supply Co. and the U. S. Forest Service in 1935 has shown that the removal of beetle infested trees in a salvage logging program results in a substantial reduction of subsequent insect loss but not in a complete utilization of values represented

because of degrade for bluestain. (3)

Tentative results of recent work on the Black's Mountain Experimental Forest indicate that the removal of high risk trees from the stand by selective logging practice has good possibilities both as a means of completely utilizing the values represented and materially reducing the insect activity. From data collected at Black's Mountain over a period of only 30 months, it has been shown there that the removal of high risk trees reduced subsequent insect loss by approximately 90%. In spite of the probability that future data may alter this loss reduction figure, it is recommended that some action be started in the direction of a sanitation-salvage cut as the best means now available for reducing insect caused loss.

Specific Recommendations

Much of the Eastern Lassen Area is in need of control. However, the necessary facilities for immediate application of salvage logging control are developed only in localized areas. The two specific areas listed below seem to offer the best opportunity for immediate application of this type of control.

A. Fruit Growers Sale Area

Much of the remaining area to be logged in the F. G. S. sale area should be covered by a selective logging program for the removal of high risk trees. At present, some areas offer better possibilities for pre-logging treatment than others. It is suggested that sections 6, 7, and 8, T 33 N, R 10 E be selected during 1940 for selective logging treatment to be applied about 3 yeard in advance of the regular cutting operation to follow. By using available data from this area, it is estimated that 2,500,000 board feet of timber in trees over 20" D.B.H. could be removed from approximately 1,000 acres. Present methods of tractor yarding and truck hauling makes a light cut of this nature an economic possibility, especially as a means of reducing insect caused loss. The present road system in this localized area will conform with the stipulations set up in clause 15-e of the Fruit Growers contract.

B. Harvey Valley Infestation Unit

A majority of the Harvey Valley infestation unit to the west of the present cutover area should be considered as an additional area for selective logging procedure. A large portion of this area is in need of immediate treatment.

A 320 acre sample plot was established in the unit in 1926 and to date, the total accumulative loss on this 320 acres has amounted to 706,000 BM of merchantable timber. By applying this sample to the remaining 9,000 acres in the unit we find an estimated total of 19,800 MBM has been killed by insects during a 13 year period. Sample strip data taken in 1937 indicate that as much as 3,000 BM per acre could be

removed from portions of the area in selective logging procedure. This recommendation is made in spite of the fact that the area is outside the present sale boundaries, and salvage logging will precede a heavier cut in accordance with Forest Service standards by a number of years.

It must be emphasized that selective logging for the removal of high risk trees is not proposed as a means of completely eliminating insect caused loss by a single treatment of an area. Periodic cuts will undoubtedly by necessary as changes occur in the decadence of existing stands.

3. Burney Area

In the Burney Area the current insect loss trend indicates that continued losses are to be expected. This indication makes it necessary to recommend control action to suppress this insect activity. The destruction of beetle broods by burning the infested bark, as previously indicated, is not recommended. The best action seems to be in the possibility of a selective logging program. Some portions of the area offer better possibilities for control action than others.

A. Hat Creek Basin

Though badly needed, control action in the area extending from Hat Creek south to Old Station would be difficult because of the distances from existing mills.

B. Burney Flat

To the north and west of the Lassen N. F. boundary in T 35N, R 3 E, M. D. M., there is an area locally referred to as Burney Flat. This area is composed largely of private holdings and offers good possibilities for control action by selective logging for the removal of recently infested and high risk trees. There are two reasons for selecting this area for control recommendations: (1) The area is readily accessible to the existing mills at Burney and (2) there is a fairly large percentage of the green stand made up of high risk material that could be removed. Estimates based on data taken by the Hazard Inventory Project during 1938 show that as much as 1,500 B.M. per acre of merchantable but high risk material could be removed from a good portion of the area.

TABLE 1. Plot Losses - Lassen National Forest

(Eastern Lassen Area)

Plot No.	1937 Per Section No. Trees	1937 Per Section Volume B.M.	1937 Per A. Volume B.M.	Ratio 37/36	1938 Per Section No. Trees	1938 Per Section Volume B.M.	1938 Per A. Volume B.M.	Ratio 38/37	1939 (Estimated) Per Section No. Trees	1939 (Estimated) Per Section Volume B.M.	1939 (Estimated) Per A. Volume B.M.	Ratio 39/38
L- 1	52	37,760	59	0.5	72	69,328	108	1.8	38	32,496	51	0.5
L- 3	62	104,960	164	1.4	56	54,474	85	0.5	104	122,968	192	2.3
L- 5	36	35,840	56	0.4	26	32,748	51	0.9	98	111,932	175	3.4
L- 6	20	25,600	40	0.6	24	15,686	25	0.6	82	53,478	84	3.4
L- 7	28	37,760	59	3.3	18	32,566	51	0.9	54	68,404	107	2.1
L- 8	42	42,880	67	0.4	22	41,960	66	1.0	30	48,400	76	1.2
L- 9	44	52,480	82	0.6	13*	23,680*	37*	0.3*		Cutover	1939	
L-10	48	37,760	59	0.6	38	43,042	68	1.2	62	50,766	79	1.2
L-11	54	70,400	110	0.6	30	44,490	70	0.6	66	101,270	158	2.3
L-12	10	28,160	44	0.5	20	32,390	51	1.2	34	41,104	64	1.3
L-13	40	42,880	67	0.6	20	23,402	37	0.6	40	47,404	74	2.0
L-14	26	37,760	59	0.4	34	28,316	44	0.7	64	75,652	118	2.7
Aver.	38	46,190	72	0.8	33	38,037	60	0.9	61	68,534	107	1.8

*Estimated. Plot cutover 1939

TABLE 2. Unit Losses - Lassen National Forest

(Eastern Lassen Area)

Unit	Timbered Acreage (Virgin)	1937		1938		1939 (Est.)	
		No. Trees	Volume M.B.M.	No. Trees	Volume M.B.M.	No. Trees	Volume M.B.M.
Bogard Buttes	25,200	1,410	1,660	866	1,235	2,474	3,528
Stephens Ranch	27,760	780	940	694	861	2,349	2,915
Butte Creek	27,260	190	1,450	1,022	1,663	1,374	2,235
Hall's Flat	11,320	450	340	1,273	611	1,887	906
Nigger Spring	14,830	590	770	742	489	2,250	1,483
Beaver Creek	27,550	1,730	2,160	1,378	1,350	2,531	2,480
Black's Mountain	30,250	2,930	2,150	2,174	2,118	3,882	3,781
Crater Mountain	14,100	790	790	441	578	1,560	2,045
Harvey Valley	22,130	1,840	2,720	1,380	1,350	3,960	3,873
Strayler Lake	28,660	1,780	2,180	1,523	1,892	1,961	2,436
Gordon Valley	34,320	1,850	2,160	1,073	2,025	1,546	2,917
Cave Mountain	17,460	1,340	1,340	982	1,327	1,163	1,571
Logan Mountain	2,060	90	130	90	117	190	247
Coble Mountain	21,040	1,290	1,510	921	842	1,841	1,683
Brockman Flat	10,590	950	750	761	868	835	953
Total	314,530	18,010	21,050	15,320	17,326	29,803	33,053

TABLE 3. Unit Losses Lassen National Forest

(Mat Creek Basin)

Infestation Unit	No.of Plots	Timbered Acreage	1937 No.of Trees	1937 Volume M.B.M.	1937 Volume per Ac.	1938 No.of Trees	1938 Volume M.B.M.	1938 Volume per Ac.	Ratio 38/37	1939 No.of Trees	1939 Volume M.B.M.	1939 Volume per Ac.	Ratio 39/38
Hatchet Mountain	5	38,730	387	77	2	774	813	21	10.0	936	629	16	0.8
Cornaz Lake	9	25,400	711	1753	69	1422	1854	73	1.1	2476	4794	189	2.6
Mat Creek	5	38,730	1162	620	16	1549	2092	54	3.4	3389	4502	116	2.1
Big Springs	6	24,860	1044	1293	52	1666	2610	105	2.0	1803	3729	150	1.4
Total	25	127,720	3304	3743		5411	7369			8604	13654		
Average					29			58	2.0			107	1.8

TABLE 6. Pine Loss on Cutover Plots

Lassen Area

Plot Number	1937 Residual Stand B.M. per ac.	1938 Volume/Ac. Loss	1938 Depletion % Residual	1939 Volume/Ac. Loss	1939 Depletion % Residual
CO- 6	2,736	4	.15	14	.51
CO- 7	1,312	3	.23	16	1.22
CO- 8	3,065	4	.13	13	.42
CO- 9	3,875	3	.08	8	.21
CO-10	6,156	11	.18	35	.57
CO-25		1		3	
CO-27		4		24	
Average	3,429	4	.12	16	.47

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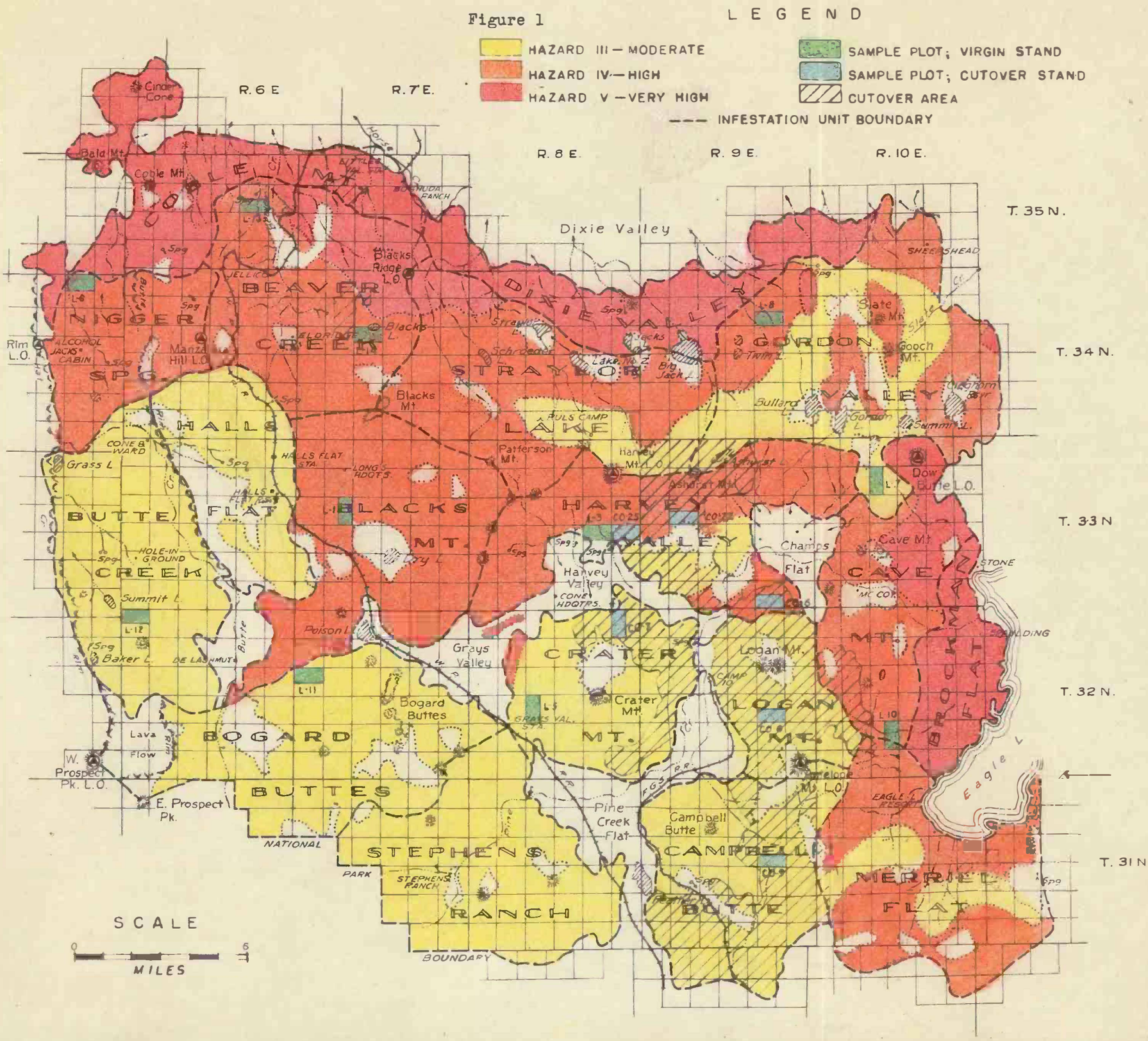
UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

REGIONAL FOREST INSECT SURVEYS

EASTERN LASSEN AREA, CALIFORNIA

Figure 1



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REGIONAL FOREST INSECT SURVEYS
BURNEY AREA, CALIFORNIA

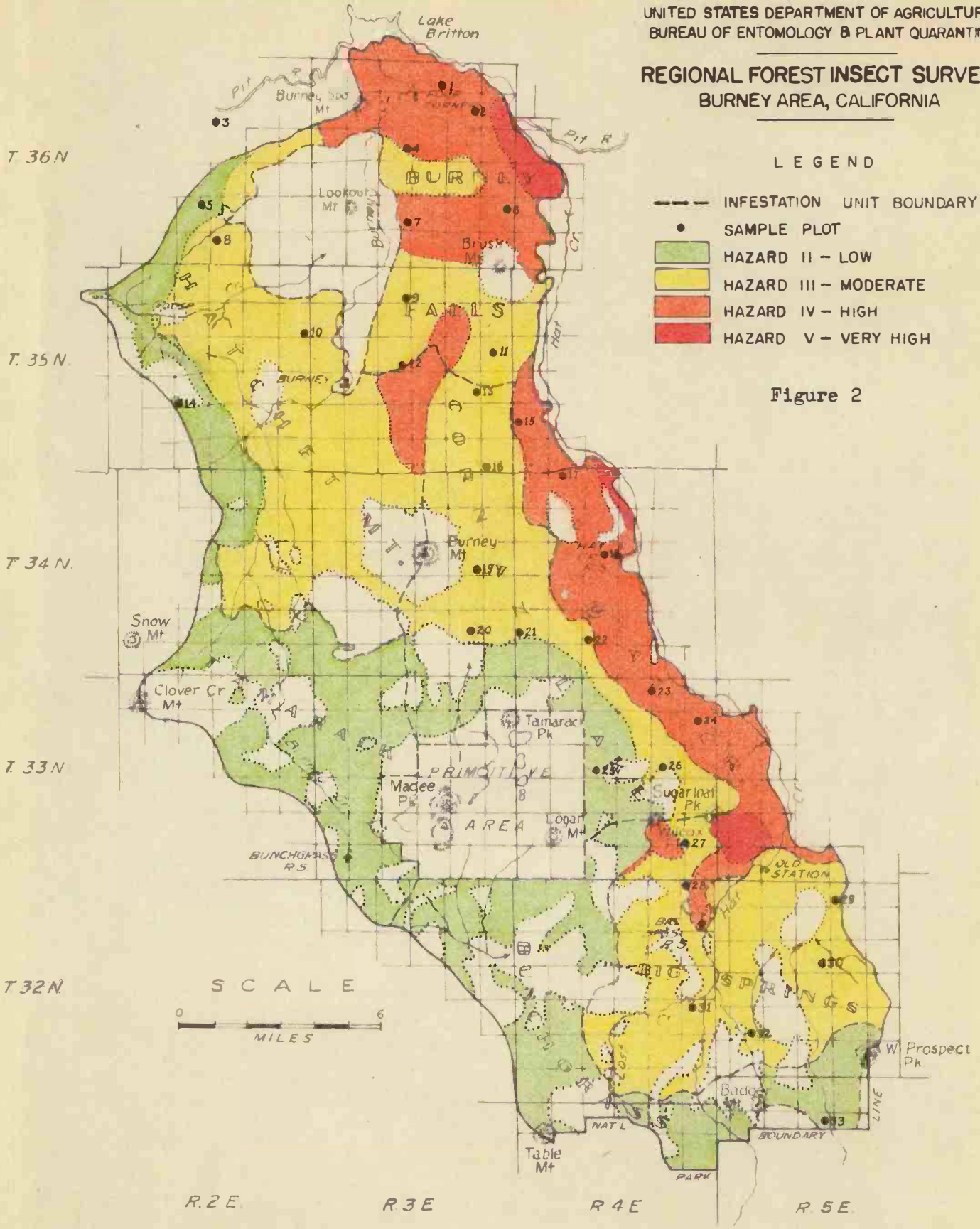

Figure 2

Basis for determining Unit Loss

(1939) figures (est.)

Bogard Buttes	L-11 + L- 5 ÷ 2 x 0.84
Stephens Ranch	L- 5 x 0.6
Butte Creek	L-12 x 1.28
Halls Flat	L- 1 x 1.37
Nigger Springs	L- 6 x 1.19
Beaver Creek	L-13 + L-14 ÷ 2 x 0.94
Blacks Mountain	L- 1 + BMEF (weighted)
Crater Mountain	L- 5 x 0.83
Harvey Valley	L- 3 x 0.91
Straylor Lake	L-14 + L- 8 ÷ 2 x 0.88
Gorden Valley	L- 8 + L- 7 ÷ 2 x 0.93
Cave Mountain	L- 7 + L-10 ÷ 2 x 0.97
Logan Mountain	L- 5 + L- 7 + L-10 ÷ 3
Coble Mountain	L- 6 + L-13 ÷ 2 x 1.01
Brockman Flat	L-10 x 1.14
Dixie Valley	(From observations only)